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ABSTRACT

Three experiments examined the influence of videotaped classroom events on the classroom performance and study behavior of groups of 17 reading disabled and 17 normally reading elementary school children (ages 7 to 12). In the first two experiments the presentation was experimenter controlled, and the distractors resulted in poorer performance in proportion to the difficulty of the task, for both groups. In the third experiment however, the children were allowed to control their degree of exposure to the distractors, and in this instance the reading disabled group was less likely than the normal group to escape the distraction. (PHR)

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Televised Classroom Events as Distractors for Reading Disabled Children

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Televised Classroom Events as Distractors for Reading Disabled Children

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Abstract

Three experiments examined the influence of videotaped classroom events on the academic performance and study behavior of reading disabled and normally reading children in grades 1 through 6. In experiments 1 and 2a an experimenter-controlled presentation of these distractors resulted in performance decrements, the magnitude of which was greater for higher difficulty tasks. The distractor effects were similar for the two groups in this condition. However, when the children, themselves, were allowed to control their degree of exposure to the same distractors in experiment 2b, the reading disabled children were less likely to act to escape the distraction. Results are discussed in terms of children's metacognitive awareness of distraction, and implications for the classroom are considered.

Televised Classroom Events as Distractors for Reading Disabled Children

The present research investigated the effects of classroom distraction on reading disabled children's academic performance and study behavior. A classical and often repeated theme in the field of special education asserts that learning disabled children typically are excessively distractible (e.g., Hallahan & Reeve, 1979). In support of this contention, some research has shown that the proportion of children either identified as distractible, or evidencing performance difficulties in the presence of certain distractors is higher within the learning disabled population (Routh, 1979; Tarver & Hallahan, 1974). Nevertheless, a theory of learning disability which posits a single, underlying attention deficit is untenable simply because distraction is a complex phenomenon which varies greatly between individuals in a specific population (e.g., Willows, 1978) and within individuals according to changes in context (Torgeson, 1975). In effect, the diagnosis of learning disability neither ensures the presence of a general distraction characteristic, nor predicts distraction within particular settings. Therefore, a major goal of research on distraction should be the determination of how particular learning disabled children are affected by different kinds of distractors in various circumstances (Patton & Offenbach, 1978).

One situational factor which may be of particular interest to educators is task difficulty. Research with adults has shown that distractor effects will vary with task difficulty level; that is, distraction may have a facilitative effect for easy tasks and a detrimental effect for difficult

tasks (e.g., Kahneman, 1970). So far, evidence for this differential effect in children is equivocal (for example, compare the outcomes of studies by Hale & Flaugher, 1977 and Sen & Chowdhury, 1974). Nor has there been relevant investigation using tasks and distractors directly representative of a classroom environment. Nevertheless, investigation of the effects of task difficulty is important to educators for two reasons. First, if distractor facilitation does occur (Sen & Chowdhury, 1974), certain kinds of schoolwork might be better carried out with some amount of extraneous stimulation. Second, it is reasonable to assume that the same classroom work assignments may be relatively more difficult for learning disabled children, thereby increasing the likelihood of their being distracted. Accordingly, attenuation of environmental stimulation or reduction of task difficulty might be more frequently desirable for these children.

A second issue addressed in this research concerns the nature of distractibility. Traditional clinical descriptions of learning disabled children have contributed to the widespread acceptance of distractibility as a static, involuntary trait requiring treatment by medication and/or environmental restriction (Cruickshank & Paul, 1971). On the other hand, recent investigations of children's learning and memory have emphasized the active nature of cognition and the importance of acquiring insight into one's own cognitive processes (e.g., Brown, 1978). Viewed from this "metacognitive" perspective, distractibility might be conceptualized as a failure to perceive the need for, or to enact appropriate attentional strategies (Torgeson, 1977). Further, the remedial techniques resulting from such a view might be quite different from traditional, clinical

prescriptions (e.g., Workman & Hector, 1978). Unfortunately, there has been little empirical work relating metacognitive development and attentional processes.

The purpose of the present study, then, is twofold: first, to determine what relationship may exist between task difficulty and distraction in learning disabled children, and second, to explore the extent to which these children are aware of and able to act appropriately to deal with the effects of distractors. To carry out the study, a carefully selected subpopulation of learning disabled children (i.e., children having "specific reading disability") performed individually-selected samples of their regular reading and math work, varied at two difficulty levels. In experiments 1 and 2a half of this work was performed in the presence of an experimenter-controlled distractor, a television monitor showing activities videotaped in each child's classroom. In experiment 2b the task was similar, but the children were allowed to control the distractor. Specific expectations were: (a) that the televised distractor would have a differential effect on performance depending upon task difficulty level (i.e., be facilitative for the easier task and detrimental for the difficult task), and (b) that, compared with normal readers, the reading disabled children would be more affected by the distractor (i.e., show performance decrements which were greater when they occurred, be less likely to identify distractor effects, and be less likely to take appropriate action to combat distraction).

Experiment 1

Method

Subjects. The subjects were 34 children attending grades 1 through 5 in a large, suburban elementary school in Cedar Rapids, Iowa. The

reading disabled children were all enrolled in the school's learning disability resource teaching program. Each child selected as reading disabled met three general criteria: (a) average or above average measured intelligence (Stanford-Binet or Wechsler IQ of 85 or higher), (b) absence of severe motor, sensory, or emotional impairment, and (c) a significant discrepancy between IQ and reading achievement. The placement staffing record of each reading disabled child indicated that the achievement deficit was confined primarily to reading. Children receiving medication for the treatment of attentional or activity problems were eliminated from the study. Finally, the WISC-R was administered to each child to obtain a current measure of intelligence. Children in a non-reading disabled group met the same criteria except that their reading achievement was average or above average as determined from their scores on reading subtests of the Iowa Tests of Basic Skills, and by their current classroom reading group placement.

Twenty-four children in the learning disability class were screened to obtain the 17 subjects (16 boys and 1 girl) classified as reading disabled. These children ranged in age from 7 years, 7 months to 11 years, 3 months (mean age 9 years, 2 months). Their IQ scores ranged from 88 to 116 (mean IQ 102).

The non-reading disabled group was made up of 17 children matched with the reading disabled children on the basis of sex and selected from the same grades and classrooms. Their ages ranged from 7 years, 1 month to 11 years, 8 months (mean age 9 years, 4 months), and their IQs ranged from 109 to 132 (mean IQ 113). Although the two groups did not differ significantly in age, the difference in mean IQ of 11 points was statistically significant, $t(16) = 3.90$, $p < .001$.

Design. The experimental design was a 2 (subject group) x 2 (distractor condition) x 2 (task difficulty) factorial, with the last two factors within subjects. The two levels of the second and third factors were distractor-no distractor and lower difficulty-higher difficulty, respectively.

Tasks. The tasks, oral reading and mathematics (addition problems), were chosen to be representative of actual classroom work, of a difficulty level appropriate for individual subjects, and with a degree of process-similarity between groups.

In order to develop sets of individualized tasks, classroom teachers were asked to identify for each child samples of daily reading material and addition problems representing "independent" (easy) and "instructional" (more demanding) difficulty levels. From these teacher-recommended samples, a set of four tasks were developed and assigned to each child: reading-low difficulty, reading-high difficulty, mathematics-low difficulty, and mathematics-high difficulty[2]. The reading tasks were presented right from the child's actual reading workbooks and were factual stories and narratives varying in length from 92 to 316 words. The addition problems were created using tables of random numbers and presented on a single worksheet (i.e., one worksheet per task) in a 3 x 4 matrix. Thus, there were 12 problems per task, with each problem randomly assigned to its matrix location.

Distractors. Distractors were segments of black and white videotaped footage (both audio and video portions, 20-25 minutes in length) recorded in each child's classroom, showing randomly selected activities during a regular group reading instruction period. These were presented to subjects on a 20 inch (50.8 cm) television monitor located directly in front of a designated work area. Loudness of the distractors ranged from

53 to 80 dB, the ambient noise level being 52.5 dB (re 0.0002 microbar SPL).

The distractors were presented continuously for half the material in each task. Thus, for oral reading, passages were divided into four sections of equal length in words, and the distractors occurred throughout a child's performance on two of the sections. Similarly, the distractors were presented and maintained throughout a child's performance on two of the four rows of additional problems of each mathematics task. Assignment of distractors to passage sections and rows of problems was made randomly for each subject.

Procedure. All experimental procedures were administered individually within the school building. In an initial session, each subject was taken to a small conference room for administration of the WISC-R. Immediately thereafter the child was taken to an empty classroom, where the experimental treatment conditions were administered. Each child was assigned to one of four task presentation sequences (R and M indicate reading and mathematics; H and L indicate high and low difficulty levels, respectively): (a) RH, ML, MH, RL; (b) RL, MH, ML, RH; (c) MH, RL, RH, ML; and (d) ML, RH, RL, MH.

Children performed the experimental tasks in an empty classroom at a table directly facing the television monitor, which was located three feet (91.4 cm) away. High panels located in front of and at the sides of the table restricted the child's view to the television monitor. On the table, between the child and the television monitor, was a 50.8 x 35.6 cm marked work location. The experimenter was seated behind and to the child's right in a location permitting a view of the child's work. From this position the experimenter

could covertly control the television distractor and record the child's response latencies.

Upon entering the classroom the child was seated at the table and the task instructions were administered. In general these informed the child that the purpose of the study was to see how well children could study without being bothered. Specifically, the child was told that samples of school work were to be performed as accurately and rapidly as possible; and that while this was being done, the television sometimes would come on. At this point the child was specifically instructed to try to ignore the television in favor of the task. Finally, a brief demonstration of the distractor was given and a few practice trials on a mathematics task were administered in order to instruct the child how to report orally the completion of the last problem in each row. The four tasks were then administered in succession.

Results

A multivariate analysis of variance was carried out to assess the effects of difficulty level and distraction upon the performance of the reading disabled and non-reading disabled children on reading latency and mathematics latency and errors[3]. This analysis revealed a significant main effect for task difficulty, $F(3,24) = 19.21$, $p < .001$, a significant main effect for distraction, $F(3,24) = 14.88$, $p < .001$, and a significant main effect for subject classification, $F(3,24) = 3.10$, $p < .05$. None of the interactions among these variables were significant in the multivariate analysis.

Univariate analysis of variance indicated that task difficulty had significant effects on mathematics latency, $F(1,26) = 56.51$, $p < .001$, and mathematics errors, $F(1,26) = 11.62$, $p < .01$. As Table 1 shows, the

children had a higher mean latency on difficult mathematics problems than they did on easy problems. Also, on difficult problems they made

Insert Table 1 about here

more errors than on easy problems. The effect of task difficulty on reading latency was not significant.

Univariate analysis also indicated that the presence of distracting stimuli significantly affected all three dependent variables, i.e. mathematics latency, $F(1,26) = 28.90$, $p < .001$, mathematics errors, $F(1,26) = 7.97$, $p < .01$, and reading latency, $F(1,26) = 4.74$, $p < .05$. Children took longer to do the addition problems with the distractor present than with the distractor absent. They made more errors with the distractor present than with no distractor. And, reading time per word of text was longer with the distractor present than with no distractor.

Finally, the difference between the reading disabled and non-reading disabled groups was significant only for reading latency, $F(1,26) = 9.38$, $p < .01$. The reading disabled children read the material more slowly than did the non-reading disabled children. The groups were not reliably different with respect to the effect of distractors.

Experiment 2a

The results of experiment 1 suggested that ongoing activity within an elementary classroom may be a source of distraction for normally achieving as well as reading disabled children. However, the validity of this conclusion may be limited by two considerations. First, the majority of children in the experiment were able to complete even the higher difficulty tasks within brief time periods (generally under three minutes). Hence, it is not clear how the distractors might affect children's performance

over the longer intervals typical of classroom work. Second, while the type of oral reading task used here (probably) constitutes a major instructional technique for children at primary grade levels, reading instruction at intermediate grade levels typically emphasizes silent reading for comprehension. Therefore, the use of a single reading task to represent the variety of reading activities normally employed over the grade levels represented is questionable. The purpose of experiment 2a, then, was to replicate and extend experiment 1 by increasing task time to a length more representative of classroom assignments. Additionally, in view of the impracticality of developing one reading task to represent instruction over five elementary grade levels, it was decided to eliminate the reading task from the second experiment. Finally, children in experiment 2a were asked to judge the effect of the distractors on their performance, following task completion. Data from those judgments, however, are more appropriately considered in the context of experiment 2b.

Method

Subjects. Thirty four boys in grades 2 through 6 were the subjects for this experiment. All were from the same school as the children in experiment 1. The children classified as reading disabled were from the same learning disability resource teaching program. All subject selection criteria were the same as for experiment 1, with one exception. Children in the non-reading disabled group were taken from "middle" (i.e., average instructional progress) reading groups within their classroom.

Twenty six learning disabled children were screened to obtain 17 male reading disabled subjects. The age range of these children was from 7 years, 5 months to 11 years, 8 months (mean age 8 years, 10 months), and their IQs ranged from 92 to 121 (mean IQ 106). The age and IQ ranges

for the 17 non-reading disabled children were 7 years, 9 months to 12 years, 5 months (mean 9 years, 2 months) and 90 to 141 (mean IQ 111) respectively. Statistical comparison of the groups on the basis of age and IQ scores indicated that they did not differ significantly on either variable.

Design. The design of this experiment replicated the 2 (subject group) x 2 (distractor condition) x 2 (task difficulty) factorial design of experiment 1.

Tasks and Distractors. The tasks for this experiment were low difficulty and high difficulty addition problems developed for and assigned to individual subjects in the same manner as in experiment 1. Here, however, the number of problems was increased to 36, presented on three worksheets of 12 problems each, using the same 3 x 4 matrix as before for each worksheet. Distractors were also developed and presented in the same manner as in experiment 1.

Procedure. The setting and procedures for this experiment were identical with those of the first experiment. The only change occurred after a child had completed performance on the experimental tasks. At this time he was asked to indicate what effect, if any, the television had had on his work. Specifically, the child was asked, "What do you think about working with the TV on? Did it help you work? Did it make your work harder? Or did it make any difference at all?" The child's response was recorded as easier, no difference, or harder (numerically scored as -1, 0, or +1).

Results

A multivariate analysis of variance was carried out to assess the effects of difficulty level and distraction on the latency[4] and errors of

the two groups of subjects on the addition problems. This analysis revealed a significant main effect of task difficulty, $F(2,31) = 3.09$, $p < .001$, and a main effect of distraction, $F(2,31) = 44.03$, $p < .001$. However, the multivariate analysis indicated no significant difference between reading disabled and non-reading disabled subjects. The only interaction which was significant in the multivariate analysis was that between task difficulty and distraction, $F(2,31) = 9.92$, $p < .001$.

Univariate analysis showed that task difficulty had significant effects on both latency, $F(1,32) = 127.77$, $p < .001$, and errors, $F(1,32) = 17.02$, $p < .001$. As Table 2 shows, the children took longer and made more errors on the more difficult problems than on the easy problems.

Insert Table 2 about here

Univariate analysis of variance indicated that the presence of the distractors significantly affected both dependent measures, i.e., latency, $F(1,32) = 79.29$, $p < .01$, and errors, $F(1,32) = 11.71$, $p < .01$. As Table 2 shows, the children took longer to do the problems with the distractor present, and made more errors when the distractor was present.

Finally, univariate analysis indicated that the interaction between task difficulty and distraction significantly affected both latency, $F(1,32) = 10.66$, $p < .01$, and errors, $F(1,32) = 7.40$, $p < .01$. As Table 2 again shows, the nature of this interaction was simply that distractors had a greater effect on the performance of difficult problems than on the performance of easy problems. Children took the longest and made the most errors when working on difficult problems under distracting conditions.

A second kind of statistical analysis carried out for experiment 2a concerned changes in performance over time. Since each subject did

three separate worksheets during the experiment, it was possible to use "pages" as a repeated measures variable in a 2 (subject group) x 2 (task difficulty) x 3 (pages) analysis of variance. The dependent measure in this analysis was the difference between distraction and non-distraction latencies. In this analysis, the main effect for pages was significant, $F(2,64) = 6.03$, $p < .01$, as was the three way interaction of subject groups, task difficulty, and pages, $F(2,64) = 3.11$, $p < .05$. The means and standard deviations corresponding to this interaction are shown in Table 3. Post

Insert Table 3 about here

hoc analysis of the differences among means for these effects (Newman-Keuls procedure) showed that, first, there was a general reduction of the distractor effect across pages ($p < .01$). On the first page of high-difficulty addition problems, the reading disabled children were more affected by distraction than the non-reading disabled children ($p < 0.5$). However, on pages two and three the groups were comparable in the effects of distraction on their performance on both high- and low-difficulty problems. None of the other interactions involving the repeated-measures pages variable were significant.

Experiment 2b

In experiments 1 and 2a the performance of reading disabled and normally reading children was found to be similarly impaired by the presentation of the experimenter-controlled distractor. However, the reduction of this impairment over trials suggested that the children had somehow learned to attenuate the distraction. This possibility is important because actual learning settings often include the opportunity for the child to alter or remove distractions (e.g., via choice of seating location or physical orientation in a classroom). The final experiment reported here

utilized the same tasks and setting as before, but, additionally, permitted subjects the opportunity to control the distractor. The goal was to investigate the extent to which reading disabled children are aware of distractors and act appropriately in their presence.

Method

Subjects. The 34 children in experiment 2a were the subjects for experiment 2b, as well.

Design. The experimental design was a 2 (subject groups) x 2 (task difficulty) factorial, with the second factor within subjects. The two levels of the second factor were low and high difficulty.

Tasks and Setting. The tasks were two worksheets of addition problems, one at each difficulty level. The setting remained the same as before except that a second chair was now placed to the left of the child's location, away from the television screen.

Procedure. After a child had completed the procedures for experiment 2a, he was taken from the classroom for a short break. Thereafter, the child was returned to the experimental setting, reseated at the table facing the television monitor, and told that he would be asked to complete two more pages of addition problems which he and the experimenter would later correct and which he would take home with him. The child was further informed that the television (distractor) would be turned on when he started work and would remain on unless the child exercised any of three alternative actions: (a) turning the sound level up or down, (b) moving to the adjacent chair, away from the television screen, or (c) changing both the sound level and work location. In explaining these alternatives to the child, it was emphasized that they were options only, to be exercised if, in the

child's judgment, they would be helpful in working the problems correctly.

After the instructions were administered, the child was asked to repeat them to insure that they had been understood. The child then was given the first worksheet, the television was turned on, and the child was told to begin working. From the back of the room the experimenter recorded the actions, if any, taken by the child and the times at which they were performed. After the child signalled completion of the first worksheet, the experimenter reinstated the initial working conditions if necessary (i.e., seating location, television sound level setting), restated the child's options, and had the child begin the second worksheet. When this was completed, the two pages were corrected. Finally, the child was asked to describe his usual place for studying at home, and his response was recorded.

Results

Five dependent measures were considered in the analysis. They were: children's judgments of distractor effect (rated interference) on their work on the addition problems of experiment 2a, total time to complete the tasks of experiment 2b, including actions such as moving to another chair or changing the sound level of the television (latency), number of incorrect solutions (errors), working condition selected by the child (action taken), and children's description of their preferred study conditions at home (home study preference).

Response alternatives for the rated interference, action taken, and home study preference measures were numerically weighted in a priori fashion. The weighting schemes were consistent with the findings of experiment 1 and experiment 2a that distraction had a deleterious effect on the child's performance. The rated interference measure, as stated

previously, was scored -1 if the child said distraction made the task easier, 0 if he said it made no difference, and +1 if he said (in agreement with the actual findings of experiment 2a) that it made the task harder. The action taken measure was scored -1 if the volume was turned up, 0 if the child took no action, +1 if the volume was turned down, and +2 if the child's seating location was changed. The home study preference measure was scored as +1 if the child stated a preference for studying in a quiet room, 0 if he preferred an ordinary room, -1 if a room with radio or television on in a room nearby, and -2 if a room with radio or television on in the room itself. The application of the F test to data from ordinal scales of this type follows the rationale presented by Anderson (1961).

To examine the main effect of subject group, a multivariate analysis was carried out on all five dependent measures, and this was significant, $F(5,28) = 4.68$, $p < .01$. Univariate analyses of variance indicated that the differences between reading disabled and non-reading disabled subjects were significant for only three of the measures, namely action taken to resist distraction, $F(1,32) = 12.52$, $p < .001$, latency, $F(1,32) = 5.71$, $p < .05$, and errors, $F(1,32) = 4.19$, $p < .05$. As Table 4 shows, the

Insert Table 4 about here

non-reading disabled children took more appropriate action to resist distraction. They also took longer to complete the tasks and made more errors than the reading disabled children, suggesting that the tasks were not well matched in difficulty in this case. The group differences were nonsignificant on the other measures (rated interference of distraction and home study preference).

The other multivariate analysis of variance concerned only the four dependent measures where both task difficulty and subject group were factors (i.e., the home study preference variable was excluded). These analyses indicated a significant effect of task difficulty, $F(4,29) = 20.81$, $p < .001$. Univariate analyses showed that task difficulty had a significant effect on rated interference, $F(1,32) = 8.56$, $p < .01$, latency, $F(1,32) = 86.23$, $p < .001$, and errors, $F(1,32) = 16.74$, $p < .001$. As Table 4 shows, subjects' ratings indicated that they experienced greater interference of distraction on the more difficult tasks. They took longer to perform the more difficult tasks and made more errors on them. In the multivariate analysis, the interaction of task difficulty and subject group was not significant.

Discussion

An important feature of this study was the selection and presentation of distractors. Previous research with learning disabled children often had employed as distractors stimuli which were atypical of real learning settings (e.g., loud hooters, flashing lights). Thus, a major goal of this study was to develop distractors which were representative of the kinds of events children actually experience at school (hence, the employment of televised activities videotaped right in each subject's classroom). Additionally, Mazdol (1973) has distinguished between "internal" and "external" distractors, the former referring to factors inherent in a task (e.g., non-target items in a visual search display), and the latter describing extraneous, task-irrelevant events (e.g., building noises; see Douglas, 1972 and Van Hover, 1974). Traditionally, distractors of the external kind have received the most discussion in the clinical and educational literature.

Experiments 1 and 2a investigated the effects of task difficulty

and specific reading disability on distraction under conditions which did not allow direct control of the distractors by the child. Three findings of interest emerged. First, it was clear in both experiments that the television distractor had a detrimental effect on the rate and accuracy of the children's performance. Previous research had indicated that the use of isolation cubicles might not be effective for enhancing children's immediate performance (Somervill, Hill, White, York, & Hayes, 1978) or long term achievement (Rost & Charles, 1967). But, to the extent that the tasks and distractors employed here are more representative of actual classroom conditions than those of previous research, the data suggest that distraction is a normal product of the school setting, and that, for tasks similar to those used here, the reduction of such stimulation should lead to a better performance.

Another finding of interest was the interaction of task difficulty with distractor condition obtained in experiment 2a. Contrary to the specific prediction, the presence of the distractor did not facilitate children's performance on the easier tasks. Rather, performance decrements occurred at both task difficulty levels, with the magnitude of interference being greater for the difficult tasks. One factor complicating interpretation of this effect is that the difficult tasks required more time to perform, generally. Therefore, the interaction might be explainable in terms of some time-related factor such as fatigue. To evaluate this possibility, separate Pearson product-moment correlations were computed between children's latencies on the trials without distraction and difference scores representing the effects of distraction on latency and error scores. None of these correlations was significant for either subject group in either experiment. Apparently the distraction effects were not explainable in terms of task

time as such.

One immediate educational implication of the above results is that, where a teacher may be concerned with reducing the possibility of distraction, providing a student with an easier version of a full-length assignment may be preferable to reducing the length of a more difficult assignment. In the classroom, much of what appears to be a child's "excessive distractibility" may be simply a response to material which is too difficult for that child. As for the possibility of facilitation occurring in he school setting as a result of distracting stimuli, a consideration of the relevant literature suggests that this phenomenon has been demonstrated most often when tasks are simple and repetitive to the extreme. How often such tasks (and hence, the effect) occur normally in a classroom is a question for further research.

A third finding of experiments 1 and 2a which merits discussion pertains to the subject classification factor. The selection of reading disabled children as subjects for this research was an attempt to restrict the wide range of problems subsumed under the heading "learning disabilities" to a smaller, yet educationally meaningful population. It was predicted, on the basis of clinical theory, that as compared to control subjects, the reading disabled children's performance would be more adversely affected by the presentation of the distractors. This, in fact, was not the case. Instead, the magnitude of the distractor effects was similar for the two groups.

In evaluating this outcome, two possibilities might be considered. On the one hand, Zentall, Zentall, and Barack (1978) conclude that by and large, learning disability research employing peripheral (i.e., external) distractors has not demonstrated differential group effects. Though some

exceptions to this conclusion can be noted (e.g., Patton & Offenbach, 1978), Hale and his associates have presented convincing evidence that children's susceptibility to the effects of external distractors is not related to age (Hale & Flaugher, 1978; Hale & Stevenson, 1974). Thus, it may be the general case that children, reading disabled or otherwise, readily learn to deal with external distractors.

On the other hand, inspection of the present data reveals wide individual differences within both groups in the range of distractor effects obtained. Certainly there are particular children whose response to external distraction is pronounced. Because the reading disabled population itself is heterogeneous, it is possible that particular subgroups of this population are especially susceptible to distraction. We have not been able to identify any such subgroups in the present study. The data of this study (including post hoc correlations between the dependent measures and such subject variables as IQ, chronological age, and degree of reading deficit) did not reveal any basis for identifying such subgroups of children.

The findings of experiment 2b were perhaps the most provocative in the study. In experiment 2a, consistent with a finding previously reported by Patton and Offenbach (1978), it was observed that distractor effects decreased over trials. This suggested that, in the course of performing, the children somehow may have learned about and adopted strategies for dealing with the distractors. Accordingly, experiment 2b was designed as an attempt to find out more about the children's metacognitive awareness of distractors, by examining their statements about them and observing their actions when they were given an opportunity to alter the distractors.

The comparison of rated interference scores regarding the task carried

out in experiment 2a showed the two subject groups to be similar in their judgments of distractor influence (i.e., failing, generally, to report any distractor effect for the easy task, but showing increased recognition of the effect for the difficult task). However, the groups were significantly different with respect to the action taken measure. Children in the non-reading disabled group acted, generally, in such a way as to resist the effects of the distractor, while reading disabled children did not.

To clarify this effect, it might be useful to consider the raw data on the action taken measure (presented in Table 5) from two perspectives.

Insert Table 5 about here

First, in terms of the frequency of any action, there were more children in the non-reading disabled group who did, in fact, perform one of the three alternatives provided. This was particularly evident for the difficult task, where only 5 of the 17 reading disabled children, as opposed to more than half of the non-reading disabled children, elected to alter the distractor. Second, the children in the two groups who did act differed with respect to the direction of their actions. That is, every child in the non-reading disabled group who responded reduced the volume of the distractor (including one subject who reduced the volume and also moved to the other chair). But four of the five reading disabled children who responded increased the volume of the distractor.

In general, then, the results of experiment 2b indicate that many elementary school children, but especially those classified as reading disabled, may fail to act, on their own, to reduce distraction (in fact, may select working conditions which increase it). The question, of course, is why this should occur. One possibility is that reading disabled children

possess, but do not spontaneously enact appropriate attentional strategies (i.e., demonstrate a production deficiency). However, this would not explain why, in this experiment, some reading disabled children acted in such a way as to produce an apparent worsening in their working conditions.

Another hypothesis was suggested by children's informal responses to questioning following completion of the experimental procedures. When asked about their failure to act (or their decision to increase distractor loudness), many of the reading disabled children explained that, indeed, they had experienced greater subjective difficulty in performing with the distractors, but had not believed this to have any adverse effect on their task performance. This might suggest the operation of a metacognitive deficiency in perceiving task-distractor attributes and their inter-relationships. For example, assuming that the addition tasks used here were performed via some auditory-vocal strategy (e.g., subvocal rehearsal of arithmetic facts), children in the non-reading disabled group, by turning down distractor volume reduced or eliminated a most important source of interference (i.e., stimulation presented in the same channel used for processing arithmetic problems). Reading disabled children, on the other hand, may have been unaware of such task and distractor attributes and therefore would see no relationship between the two (hence, no reason for changing the distractor). This possibility should be further explored in future research.

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Footnotes

1. (This footnote is on the face sheet)
2. In two cases a reading disabled subject's reading skills would not permit instruction in the school's regular reading series. For these two subjects, reading tasks were developed from their remedial reading materials used in the learning disability program.
3. The possibility of using IQ scores as a covariate in these analyses was considered but rejected because IQ was found not to be significantly correlated with any dependent measure.
4. The analyses reported for experiments 2 and 3 were carried out on untransformed latency data. The analyses were also done on logarithmically transformed latency data, with no changes in the direction or significance of the results.

Table 1

Means and Standard Deviations Corresponding to

Significant Effects in Experiment 1

Effect	Level	Means and (SDs)		
		Math Latency[a]	Math Errors	Reading Latency[b]
Task Difficulty	Difficult	139.09 (69.68)	0.88 (1.04)	
	Easy	59.40 (30.79)	0.31 (0.49)	
Distraction	Present	108.48 (47.14)	0.78 (0.82)	0.49 (0.42)
	Absent	88.85 (43.87)	0.41 (0.61)	0.45 (0.37)
Group	Reading Disabled			0.66 (0.47)
	Non-RD			0.27 (0.14)

a-- Seconds

b-- Seconds per word

Table 2

Means and Standard Deviations Corresponding to

Significant Effects in Experiment 2a

(First Analysis)

Effect	Level	Means and (SDs)	
		Math Latency[a]	Math Errors
Task Difficulty	Difficult	336.58 (102.18)	3.53 (3.21)
	Easy	162.69 (50.65)	1.37 (1.87)
Distraction	Present	270.87 (79.55)	2.71 (2.64)
	Absent	228.40 (73.28)	2.19 (2.44)
Interaction of Difficulty and Distraction	Difficult Distraction Present	364.47 (105.16)	4.03 (3.75)
	Difficult Distraction Absent	308.68 (99.19)	3.03 (2.66)
	East Distraction Present	177.26 (53.94)	1.38 (1.52)
	Easy Distraction Absent	148.12 (47.36)	1.35 (2.21)

a--Seconds

Table 3

Means and Standard Deviations Corresponding to Significant Effects for the Analysis of Latency Difference Scores (Distraction-Nondistraction) for Experiment 2a Three-Way Interaction

Subject Group		Pages and Task Difficulty Levels					
		1		2		3	
		Easy	Difficult	Easy	Difficult	Easy	Difficult
Reading Disabled	$\bar{X}$	14.94	41.94	12.47	14.06	2.82	14.64
	(SD)	(13.73)	(31.90)	(17.24)	(29.41)	(10.55)	(28.02)
Non-RD	$\bar{X}$	14.94	13.59	7.59	19.12	6.35	8.24
	(SD)	(13.81)	(23.20)	(14.85)	(27.51)	(12.25)	(22.96)

Table 4

Means and Standard Deviations Corresponding to

Significant Effects in Experiment 2b

Effect	Level	Means and (SDs)			
		Rated Interference	Action Taken	Math Latency[a]	Math Errors
Group	Reading Disabled		-.14 (.46)	167.09 (35.69)	.88 (.70)
	Non-Reading Disabled		.56 (.68)	207.03 (58.55)	1.59 (1.24)
Task Difficulty	Difficult	.47 (.66)		250.29 (72.46)	1.88 (1.81)
	Easy	.09 (.51)		125.88 (51.04)	.59 (.82)

a-- Seconds

Table 5

Frequencies of Children Selecting Response Alternatives for Action Taken Measure

Group	Task Difficulty	Response Alternative Selected			
		-1 Volume Up	0 No Action	+1 Volume Down	+2 Location Change
Reading Disabled	Difficult	4	12	1	0
	Easy	3	13	1	0
Non-Reading Disabled	Difficult	0	8	5	4
	Easy	1	11	3	2